CENTER FOR BEAM PHYSICS SEMINAR

"Introduction to Quantum Computing"

Prof. Alex Dragt
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Friday May 17, 2002, 10:30 AM
Albert Ghiorso Conference Room (71-264), LBNL
••• Refreshments served at 10:20 AM •••

Abstract: Despite its great success, many find Quantum Mechanics hard to understand and some believe it is not a complete theory. Until recently this has not caused too much concern since "quantum weirdness" has been confined to the microscopic world of atoms and elementary particles where one is perhaps not too alarmed to see apparent violations of "common sense" expectations. We know how to use Quantum Mechanics, and when logical/philosophical questions are raised about Quantum Mechanics, the general response has been to simply say, "Shut up and calculate!"

However, with modern experimental techniques and tools, it now appears to be in principle possible to produce quantum weirdness at the macroscopic level. One such possibility is a Quantum Computer. If realized, this manifestation of quantum weirdness in our everyday world would produce a conceptual revolution in our intuitive understanding of reality. It could also lead to a technological revolution that would far surpass that already produced by present-day electronics, communication, and computers. If it could be built, a Quantum Computer would be vastly more powerful (for some classes of problems) than a conventional computer. It could in principle solve some problems in seconds that would take any conventional computer billions of years to solve. Because of this promise, the Federal Government is currently supporting some $50 million/year of research on the general subject of quantum information/computing. There are also active programs in Europe and Japan.

This lecture will provide an introductory overview of this new and exciting subject.

Biographical Sketch: Alex Dragt is Professor of Physics at the University of Maryland where he heads a Dynamical Systems and Accelerator Theory Research Group, and is currently spending a 6-month sabbatical leave at LBNL. He comes from a particle theory background (thesis work at Berkeley) and has interests in nonlinear dynamics, group theory, and more recently in quantum computing. Related Web sites are www.physics.umd.edu/dsat and www.physics.umd.edu/sqc